


UTAH
Department of Transportation

**ACCELERATED
BRIDGE CONSTRUCTION**

PHASE II: PRELIMINARY DEVELOPMENT WORKSHOP

Box Culvert and Wildlife Crossings

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Why use precast box culverts?

- Many States have used precast box culverts
- Significantly faster than cast-in-place
- Can be handled as a contractor design item

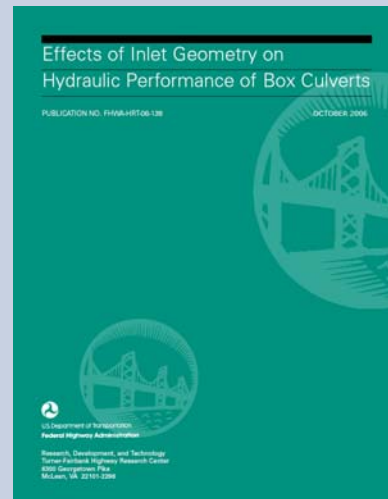
Quality and Durability

- Precast culverts have been in use for many years with excellent performance
- Minimal cracking during casting
 - Shrinkage cracking I virtually eliminated
- Use higher quality plant produced concrete



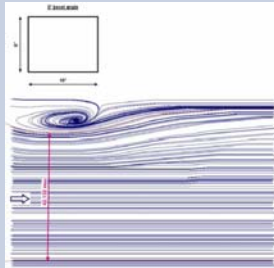
Hydraulic Issues

- Effects of Inlet Geometry
 - 2006 FHWA Report
 - Based on laboratory studies of different culvert configurations
 - Sponsored by FHWA and South Dakota DOT

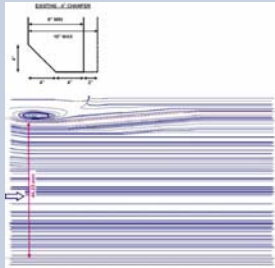


Hydraulic Issues

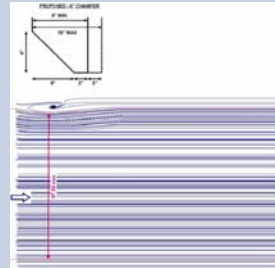
- Top slab inlet geometry can affect hydraulic performance



Square Edge



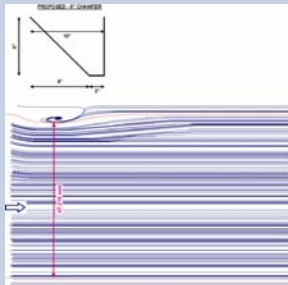
4" Chamfer



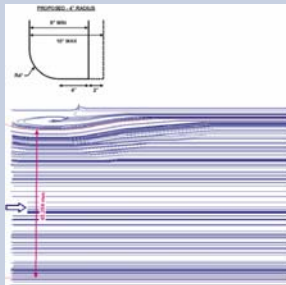
6" Chamfer



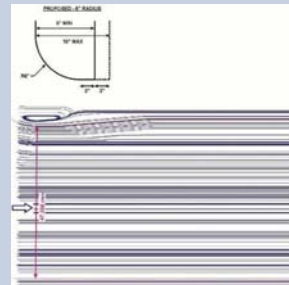
Hydraulic Issues



8" Chamfer



4" Radius

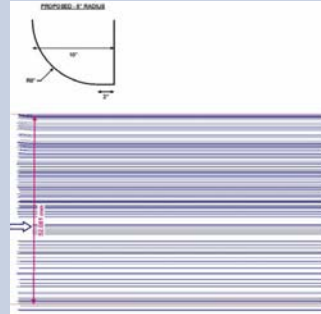


6" Radius



Hydraulic Issues

- The 8" radius can significantly increase the hydraulic capacity of the culvert
- For thinner top slabs, the 6" radius could be used



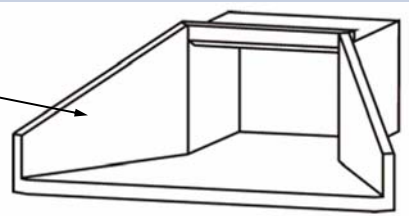
8" Radius



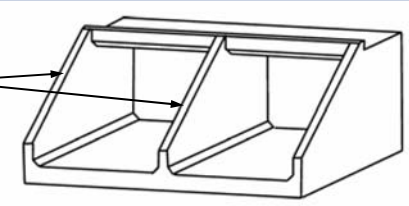
Hydraulic Issues

- Other geometric preferences

Flared wingwalls

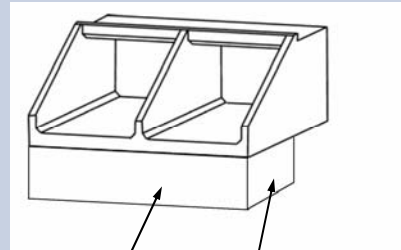


Sloped Inlet Walls



Scour Issues

- Use cut-off and return walls at inlet and outlet to prevent scouring at culvert ends



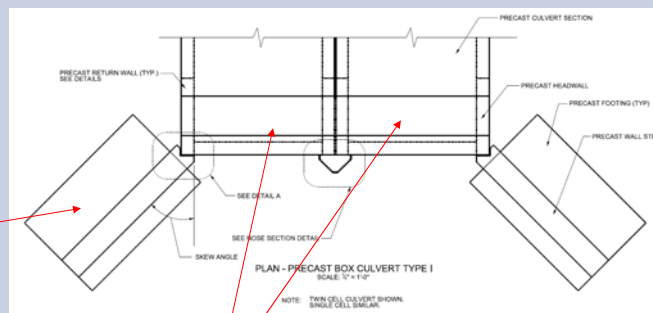
Cut-off wall

Return wall



Proposed Details

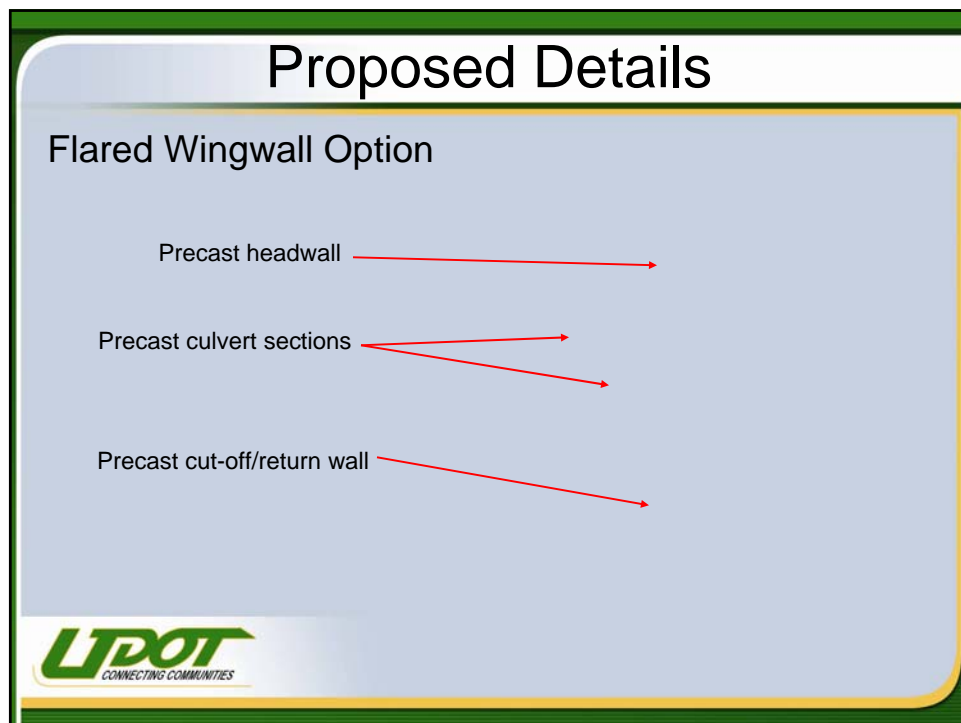
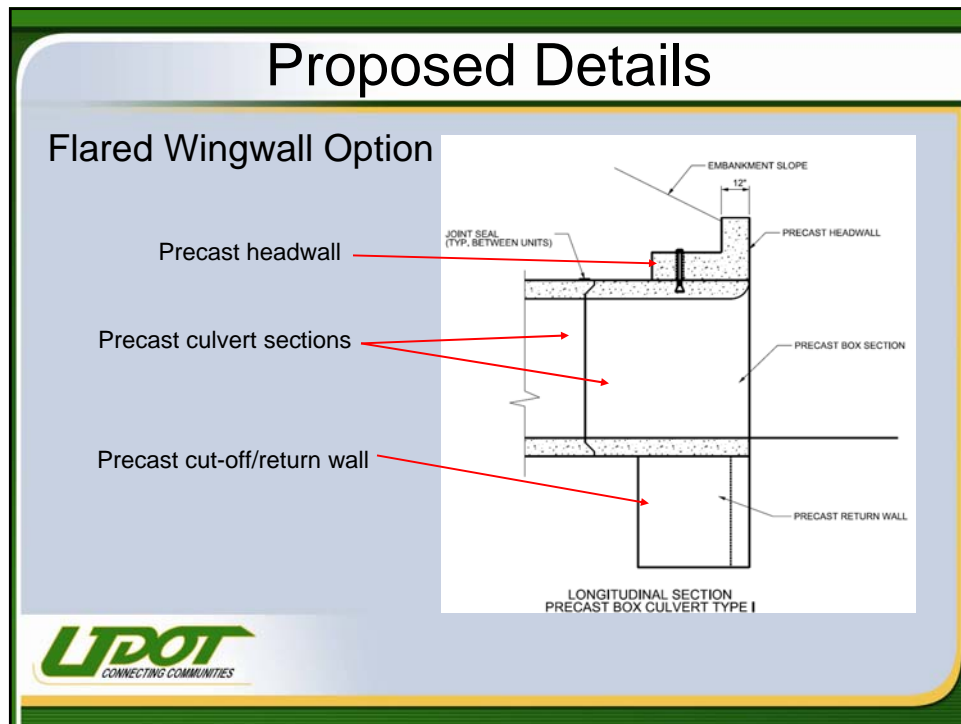
Precast wingwalls



Make multi-cell culverts by placing single cell precast pieces side by side

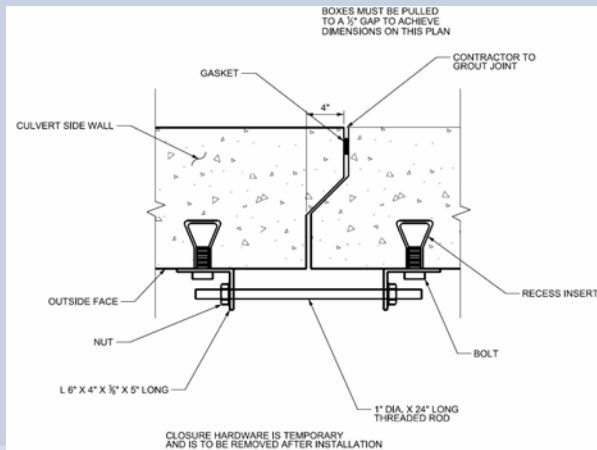
Flared Wingwall Option





Proposed Details

Closure Hardware



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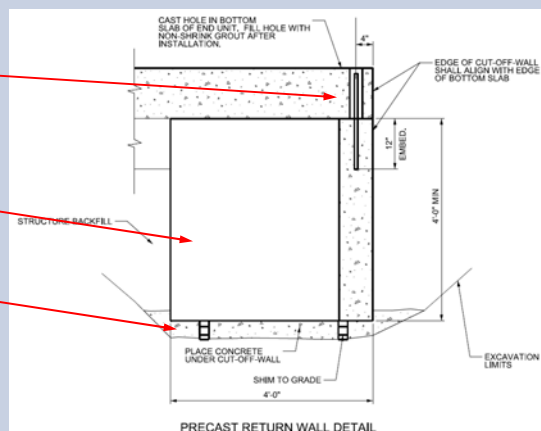
Proposed Details

- Cut off wall details

Dowel wall into culvert bottom

Precast cut-off/return wall made from culvert section

Seat wall with concrete bedding



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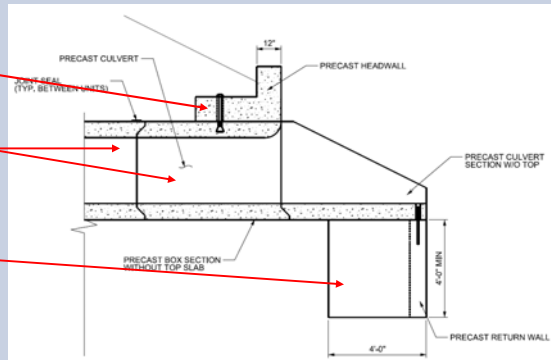
Proposed Details

Sloped Wall Option

Precast headwall

Precast culvert sections

Precast cut-off/return wall



Wildlife Crossings

- There are many options that have been used in Utah
- There are prefabricated options
 - Corrugated metal culverts
 - Precast arches (Conspan, Bebo, etc.)
- Phase II ABC
 - Develop a single span bridge using details presented today



Conclusions

- Inlet geometry can have a significant affect on hydraulics
- It is possible to build culverts with all precast elements
- Installation times can be changed from months to days
- Consider allowing fabricator design option
 - Similar to concrete pipes



Questions?

